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BANNER & WITCOFF, LTD. 28 STATE STREET 28th FLOOR BOSTON, MA 02109-9601			MCNELIS, KATHLEEN A	
			ART UNIT	PAPER NUMBER
			1742	

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/647,022

Applicant(s)

LI ET AL.

Examiner

Kathleen A. McNelis

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 18-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7 and 8 is/are rejected.
- 7) ☒ Claim(s) 9

### **Claims Status**

Claims 1-5 and 7-23 remain for examination wherein claims 1-3 are amended, claims 18-22 are withdrawn from consideration and 23 is new.

### **Status of Previous Rejections**

The previous rejection of claims 1-17 under 35 U.S.C. 103(a) as being unpatentable over GB 1004352 (GB '352) in view of Harney et al. is withdrawn in view of applicant's arguments and amendments to the claims.

### **DETAILED ACTION**

#### ***Claim Objections***

Claims 9-17 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependencies exist as follows:

- Claim 9, dependent on claim 7 which depends from any of the previous claims;
- Claim 10, dependent on claims 7 and 9, which depend from any of the previous claims;
- Claim 11, dependent on claims 7, 9 and 10, which depend from any of the previous claims;
- Claim 12, dependent on claims 7 and 9-11, which depend from any of the previous claims;
- Claim 13, dependent on claims 7 and 9-12, which depend from any of the previous claims;
- Claim 14, dependent on claims 7 and 9-13, which depend from any of the previous claims;
- Claim 15, dependent on claims 7 and 9-14, which depend from any of the previous claims;
- Claim 16, dependent on claims 7 and 9-15, which depend from any of the previous claims;
- and
- Claim 17, dependent on claims 7 and 9-16, which depend from any of the previous claims.

See MPEP § 608.01(n). Accordingly, the claims 9-17 have not been further treated on the merits.

*Election/Restrictions*

Newly submitted claim 23 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

- I. Claims 1-22, drawn to a method for preparing a porous body by impregnating a polymer foam, then pyrolyzing the polymer to create a metal foam, classified in class 419, subclass 2.
- II. Claim 23, drawn to a method for coating a sintered porous metal article, classified in class 419, subclass 26.

Inventions I and II are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product, and the species are patentably distinct (MPEP § 806.05(j)). In the instant case, the intermediate product is deemed to be useful as a porous metal body (e.g. and electrode for an electric cell as taught by Duperrary et al., U.S. Pat. No. 4,569,821) and the inventions are deemed patentably distinct because there is nothing on this record to show them to be obvious variants. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 23 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 97/31738 (WO '738) in view of Duperray et al. (U.S. Pat. No. 4,569,821) and Eber et al.<sup>1</sup> (U.S. Pat. No. 2,686,958).

WO '738 discloses a method for preparing a porous metal body by coating a reticulated interconnected web precursor with a slurry containing binder and metal (p. 5 lines 25-35). The precursor is an organic material which is burned off and the resulting metal decarburized and sintered (as in instant claim 2) in a partial pressure atmosphere or reactive gas (i.e. pyrolysis; abstract). In Example 5, WO '738 discloses impregnation with titanium powder (as in instant claims 7 and 8) and PVA binder slurry wherein the selected foam is impregnated with the titanium slurry, then cured (i.e. dried) at 250 to 350 °F then heated in a vacuum to decarburize (i.e. pyrolyzed) followed by sintering in a vacuum (p. 14 line 15 – p. 16 line 16).

With respect to claim 1, while WO '738 teaches that the foam is an organic material, WO '738 does not disclose that the organic foam material is polymeric.

Duperray et al. discloses a method for forming a porous metal body by preparing a foam, incorporating metal powder to form a suspension then heating to pyrolyze the organic material and sinter the metal (abstract). The foam is polymeric, preferably belonging to the polyurethane family (col. 2 lines 1-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a polymeric material as taught by Duperray et al. as the web precursor organic material in the process of WO '738, since WO '738 is silent regarding the type of organic material used and Duperray et al. teaches that this material can be removed by pyrolysis leaving a porous metal structure, which is desired in the process of WO '738. Duperray et al. also teaches that the resulting gas from pyrolysis must be evacuated or trapped when polyurethane is used (col. 3 lines 27-32).

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<sup>1</sup> The first named inventor on U.S. Pat. No. 2,686,958 is M. Eber, and the face of the patent recites M. Eber et al. However, this patent is identified by USPTO software and on the Notice of References Cited by the second named inventor, William J. Knochel.

Art Unit: 1742

WO '738 in view of Duperray et al. does not teach placing metal hydride particles in a different location in the pyrolysis environment.

Eber et al. discloses a method of coating and bonding (title) in a vacuum chamber of an induction heater where a better vacuum is achieved through a combination of gettering agent and pump (col. 3 lines 1-8). The gettering agent is a metal hydride powder suspended in a suitable vehicle and binder that is painted onto the interior of the vacuum chamber (col. 3 lines 45-55). Examiner asserts in the absence of evidence to the contrary that the interior surface of the vacuum chamber is a different location than the impregnated foam occupies in the furnace. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a metal hydride gettering agent as taught by Eber et al. in the process of WO '738 in view of Duperray et al., since Eber et al. teaches that it provides a better vacuum while coating and Duperray et al. teaches that the gas from pyrolysis must be evacuated or trapped when polyurethane is used.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 1,004,352 (GB '352) in view of Eber et al. (U.S. Pat. No. 2,686,958) and Duperray et al. (U.S. Pat. No. 4,569,821).

GB '352 discloses a method for making a foam of a metal or metal alloy by impregnating an organic structure with a suspension of a metal material in powdered form then heating to a temperature sufficient to reduce and decompose the organic structure (p. 1 lines 43-66). GB '352 teaches that cured polyurethane foam is a preferred organic structure and that the metal is mixed with a binder prior to impregnation (p. 2 lines 1-10).

GB '352 does not teach placing metal hydride particles in a different location in the pyrolysis environment.

Eber et al. discloses a method of coating and bonding (title) in a vacuum chamber of an induction heater where a better vacuum is achieved through a combination of gettering agent and pump (col. 3 lines 1-8). The gettering agent is a metal hydride powder suspended in a suitable vehicle and binder and it is painted onto the interior of the vacuum chamber (col. 3 lines 45-55). Examiner asserts in the absence of evidence to the contrary that the interior surface of the vacuum chamber is a different location than the impregnated foam occupies in the furnace. Duperray et al. discloses a similar method of forming a porous metal structure from a structure polyurethane as discussed above in the rejection of claims 1, 2, 7 and 8 under 35 U.S.C. 103(a) as being unpatentable over WO '738 in view of Duperray et al. and Eber et al. Duperray et al. teaches that the gas from pyrolysis must be evacuated or trapped when polyurethane is used. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a metal hydride gettering agent as taught by Eber et al. in the process of GB '352, since Eber et al. teaches that it provides a better vacuum while coating and Duperray et al. teaches that the gas resulting from pyrolysis of polyurethane must be evacuated or trapped (col. 3 lines 27-32).

Claims 1, 2, 3, 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haack et al. (U.S. Pat. No. 6,706,239) in view of Eber et al. (U.S. Pat. No. 2,686,958) and Duperray et al. (U.S. Pat. No. 4,569,821).

Haack et al. discloses a method of co-forming a metal article comprising a metal foam on the inside or outside surface of a metal tube or plate. A polymeric foam is coated with a metal powder, placed in contact with a powdered metal component and heat treated to volatilize polymeric foam and solidify the component (abstract). The preferred polymeric foams are polyurethane (col. 4 lines 10-18). Suitable metals include stainless steel, nickel, nickel alloys and zirconium as in instant claims 4 and 7 (col. 3 lines 36-42). The metal powder is mixed with a



Art Unit: 1742

binder and liquid (col. 3 line 67 – col. 4 line 5) to form a slurry, which is impregnated into the polymeric foam (col. 4 lines 18-30). The composite is dried prior to heat treatment (col. 5 lines 7-10) then heat treated in a controlled atmosphere or vacuum furnace to volatilize the polymeric foam and any organics or binders (i.e. pyrolysis) and to solidify the powdered metal component into a solid part (i.e. sintering) (col. 5 lines 1-35).

With respect to claims 1 and 3, Haack et al. does not teach placing metal hydride particles in a different location in the pyrolysis environment.

Eber et al. discloses a method of coating and bonding (title) in a vacuum chamber of an induction heater where a better vacuum is achieved through a combination of gettering agent and pump (col. 3 lines 1-8). The gettering agent is a metal hydride powder suspended in a suitable vehicle and binder and it is painted onto the interior of the vacuum chamber (col. 3 lines 45-55). Examiner asserts in the absence of evidence to the contrary that the interior surface of the vacuum chamber is a different location than the impregnated foam occupies in the furnace. Duperray et al. discloses a similar method of forming a porous metal structure from a structure polyurethane as discussed above in the rejection of claims 1, 2, 7 and 8 under 35 U.S.C. 103(a) as being unpatentable over WO '738 in view of Duperray et al. and Eber et al. Duperray et al. teaches that the gas from pyrolysis must be evacuated or trapped when polyurethane is used. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a metal hydride gettering agent as taught by Eber et al. in the process of Haack et al. since Eber et al. teaches that it provides a better vacuum while coating and Duperray et al. teaches that the gas resulting from pyrolysis of polyurethane must be evacuated or trapped (col. 3 lines 27-32).

With respect to claim 2, examiner contends that solidification of the powdered metal component into a solid part (col. 5 lines 1-35) is sintering.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haack et al. (U.S. Pat. No. 6,706,239) in view of Eber et al. (U.S. Pat. No. 2,686,958) and Duperray et al. (U.S. Pat. No. 4,569,821) as applied to claims 3 and 4 and further in view of WO 97/31738 (WO '738).

Haack et al. in view of Eber et al. and Duperray et al. is applied as discussed above regarding claims 3 and 4.

Haack et al. in view of Eber et al. and Duperray et al. does not disclose using the method for titanium or titanium alloys.

WO '738 discloses a method for preparing porous metal bodies that is similar to that disclosed by Haack et al. in view of Eber et al. and Duperray et al. as discussed above regarding the rejection of claims 1, 2, 7 and 8 under 35 U.S.C. 103(a) as being unpatentable over WO '738 in view of Duperray et al. and Eber et al. WO '738 further discloses that the porous metal products have a wide range of uses including biomaterial applications (p. 20 lines 6-12). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use titanium as taught by WO '738 in the process of Haack et al. in view of Eber et al. and Duperray et al., since Haack et al. discloses that the method can be practiced with similar materials (col. 3 lines 36-45) and WO '738 discloses that a similar porous structure of titanium has a wide variety of uses including biomaterial applications.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haack et al. (U.S. Pat. No. 6,706,239) in view of Eber et al. (U.S. Pat. No. 2,686,958) and Duperray et al. (U.S. Pat. No. 4,569,821) as applied to claims 3 and 4 and further in view of WO 83/00282 (WO '282).

Haack et al. in view of Eber et al. and Duperray et al. is applied as discussed above regarding claims 3 and 4.

Haack et al. in view of Eber et al. and Duperray et al. does not disclose using the method for titanium or titanium alloys.

WO '282 discloses a method of producing a porous coating on preselected areas of a prosthesis for implant using a blend of metallic particles which are compressed, and heated to assure metallurgical bonding (abstract). In Example 3, a Ti6Al4V alloy coating is applied to a circular disk of the same alloy using a binder (pp. 14-16). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a titanium alloy as taught by WO '282 in the process of Haack et al. in view of Eber et al. and Duperray et al. to produce a prosthesis device suitable for implant as taught by WO '282.

#### ***Response to Arguments***

Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen.A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1742

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